THE SPECTRUM.

and if allowed to shine by their own light without a brighter light being transmitted through them, they give bright lines in the same positions as the dark lines; and, secondly, that around the sun and above the vapors of the ordinary metals a vast ocean of incandescent hydrogen exists, the average depth of which is some 5,000 to 6,000 miles, which is in places projected with immense velocity to heights of 60,000 or 70,000 miles.

But though much can be learned from a good eclipse, the combination of a total eclipse and of weather favorable for its observation is a rare occurrence, and the duration of the time when the photosphere is quite covered, or of "totality," is so short as to leave little time for accurate spectroscopic observations. Lockyer in 1866 had suggested the spectroscope as a means of viewing the solar prominences when the sun is not eclipsed, and about the same time Huggins announced the same idea. But as a matter of fact Janssen was the first who actually saw the lines due to the prominences in broad sunlight. This he did the day after his observation of them in the eclipse of 1868 at Guntoor. The great difficulty lay in the fact that the illumination of our atmosphere by direct sunlight is so strong that although only the edge of the sun be examined, the atmospheric illumination is strong enough to give a general spectrum, which masks the bright lines of the prominences. This difficulty has been surmounted in the following way:

When the light consisting of a mixture of diffused general sunlight and the special light given out by the solar prominences is transmitted through a prism, it is spread out as a spectrum, but the lines from the glowing prominences may not be visible with the light of the continuous spectrum as background; but if the beam of light from the prominences is passed through a succession of prisms—while the continuous spectrum consisting of every tint is more and more spread out as it passes through each prism, and is therefore rendered much feebler—the monochromatic lines due to the prominences are only separated wider apart, and, retaining nearly all their original brightness, become distinctly visible. Then, in order to see the form and size of the prominence, one special bright line is selected, the telescope fixed so as to view that part of the spectrum, and the slit of the spectroscope is made wider so as to allow the whole of the prominence to come into view. Huggins modified this method by using colored glasses to cut off as many rays as possible except the color of the line he was observing, and Janssen, Lockyer, and Zöllner conceived the idea of giving the slit of the spectroscope a rapid rotation, instead of making it wider, so that the different parts of the prominence could be seen in rapid succession and thus give an impression of its form and extent; but this latter suggestion has not been found convenient in practice.

It will be evident from what has been said before that if a high dispersion spectroscope be employed in the way described, with its slit turned radially as regards the sun, and the extreme edge of that body be focussed on the slit, in the outer part of the spectrum the bright lines of the chromosphere will be visible while the inner part will give the ordinary absorption spectrum, with some of the dark lines of which the bright lines of the chromosphere will be continuous. From the distance outward that the bright lines extend one can judge of the depth of this layer of incandescent hydrogen, while the length and position of the lines below will help to fix the limits to which the sea of vapors underneath the prominences extends, and the order in which the elements are distributed.

Besides this application of the variation of the length of the lines in mapping out the sun's atmosphere, Lockyer found that those lines of any element which are longest in the spectrum of the electric spark and most persistent are just those which are most certain to be represented by dark absorption lines in the sun's spectrum, and those short lines only seen where the vapor is very dense are frequently absent from the solar spectrum. In this way he has been able to add several more elements to the list of those existing in the sun's atmosphere. The complete list up to the present time comprises the following elements: Iron, titanium, calcium, manganese, nickel, cobalt, chromium, barium, sodium, magnesium, copper (?), hydrogen, palladium, vanadium, molybdenum, strontium, lead, uranium, aluminium, cerium, cadmium, and oxygen.

By attacking the sun locally, the sunspots, about which such diverse theories have from time to time been started, have received a satisfactory explanation. Lockyer, and subsequently Huggins a d Father Secchi, found that the spectrum of the spots resembled the usual solar spectrum, only the dark lines were thicker and darker, thus showing that the vapor of a spot is more powerfully absorbent, and therefore at a much lower temperature than the rest of the vaporous surface. Secchi, indeed, believes that he has seen the spectrum of water vapor in these spots, but whether this be so or not, little doubt exists that these spots represent inrushes of cooled vapors, through which much less light from the nucleus finds its way to our regions of observation.

STELLAR SPECTROSCOPY.

Huggins and Miller in England (1864) and Father Secchi of Rome were the first to direct special attention to stellar spectroscopy.

The spectra of stars bear generally a strong similarity to the solar spectrum, being continuous spectra crossed by dark lines.

Owing to the small amount of light received from a single star, it is necessary to use a large lens to condense as many rays as possible. From its immense distance the star appears only as a point of light without extension; it is therefore necessary to use a cylindrical lens in order to spread out the rays into a line of light which can yield a spectrum having a visible breadth. On account of the feebleness of the light, fewer prisms have to be used than with the sun.

Secchi has classified stars into four groups which approximately represent the different colored stars. The first division consists of white stars, such as Sirius, Vega, and (A.) Lyra, giving a spectrum rich in the blue rays and crossed by four dark lines due to hydrogen, together with other finer lines due to other elements. These stars, which are believed to be at an exceedingly high temperature, are evidently enveloped in a dense atmosphere of hydrogen, which, judging by the thickness of the lines, must be under considerable pressure.

The second class, consisting of yellow stars, is that to which our sun belongs, and the solar spectrum may be taken as representing the kind of absorption generally seen in this class, although the elements actually found differ somewhat in certain individual stars. Thus Aldebaran contains hydrogen, sodium, magnesium, calcium, iron, bismuth, tellurium, antimony, and mercury.

The third class, comprising chiefly the red stars, give a spectrum in which, if moderate dispersion be used, dark bands and flutings appear. These flutings, or channelled space-spectra, indicate that a more powerful absorption is taking place in the star's atmosphere, and, therefore, that it is at a much lower temperature, than in the case of those previously mentioned, and these channelled spaces, according to Lockyer, indicate that the elements have aggregated into molecules, the temperature having fallen below that point at which they can exist only as uncombined atoms.

The fourth class comprises several small stars which show three bright bands with dark absorption spaces between. They have been supposed by some to contain carbon, which gives a complex banded spectrum, but Huggins considers the position of the bands to be different from those of carbon, so that their true constitution and physical state remains for the present undecided.

Some stars have been been found to give the bright lines of hydrogen. This was so in the case of one star that appeared in 1866. In May of that year a star, previously unknown, or at least unnoticed, which must therefore have been of very small size, suddenly blazed out and became for a short time very brilliant, gradually fading away until it again became a minute star invisible to the naked eye. Huggins and Miller were enabled to make a number of observations of its spectrum, and they found that superposed upon the dark line absorption-spectrum common to all the stars they had hitherto examined were the bright lines of hydrogen. Secchi has since found that several of the telescopic stars have these bright lines in their spectra.

The moon and planets, shining as they do by reflected sunlight, give the solar spectrum, modified, however, in some cases by the absorption that has occurred in their atmosphere. Fraunhofer in 1823, Brewster and Gladstone in 1860, and later Huggins, Miller, and Janssen, all agree in stating that the lunar spectrum is the same as that of the sun. This conclusion is in entire accord with observations on the occultations of stars which have shown the absence of any refraction at the moon's edge, and therefore render certain the absence of a lunar atmosphere. But, although the moon is destitute of any appreciable atmosphere, certain planets have long been believed to possess one, and in 1864 Huggins discovered some dark absorption lines in Jupiter's spectrum, some of which agree in position with those due to aqueous vapor. Mars and Saturn also appear to have atmospheres containing aqueous vapor, while the outer planets, Uranus and Neptune, whose spectra have been examined by Secchi and Huggins, show very remarkable absorption lines. Uranus gives two broad black bands and a general absorption in the yellow, while Neptune shows six distinct absorption bands.

It has been suggested, and the view is now held by many, that these outer planets are still at a comparatively high temperature, which would, of course, account for their dense atmospheres and strong absorption.

Next to the stars and planets Huggins turned his attention to those faint and cloud-like bodies of various form and vague outline termed nebulæ.

In 1864 he examined a small nebula in the constellation Draco and found, greatly to his surprise, that instead of getting a spectrum like those yielded by any star, there appeared one consisting of three bright lines only. Of these three lines one occupied the position of the F line of hydrogen; another, the brightest, coincided with the strongest line in the spectrum of nitrogen, while the third was not coincident with that of any known element.

The question naturally arose, Why do not the other lines of hydrogen and nitrogen appear if those two lines be really due to these elements? Huggins solved the difficulty by observing that nitrogen, when rendered incandescent and the light greatly diminished by viewing from a considerable distance in air, gave only the bright double line in the green, with which this line in the nebula corresponds. Similarly, if the spectrum of hydrogen be reduced in intensity the line in the blue will remain visible after the red and the lines more refrangible than the blue have disappeared. Hence, in all probability, those nebulæ yielding this bright-line spectrum consist largely of incandescent hydrogen and nitrogen, and are therefore mainly gaseous.

Other nebulæ examined by Huggins yield faint continuous spectra, in which the light is too feeble to show whether any dark lines are present or not.

Those nebulæ that with greater telescopic power have been resolved into clusters of distinct stars show this continuous spectrum. Probably this difference of spectrum indicates an entirely different constitution in the two classes of nebulæ, those yielding the bright bands consisting of vast quantities of incandescent gases in more or less continuity and, it may be, destined to give rise to new solar systems in process of time, while the other class, many of which have now been shown to consist of enormous numbers of stars, probably separated by millions of miles from each other, only appear as luminous clouds in telescopes of moderate power owing to their immense distance from the earth.

The spectroscope in the hands of Huggins and Secchi has also given us a great deal of information about those strange visitants to our solar system, i. e., comets. A comet as seen in a telescope, usually shows a bright head and one or more appendages called tails, the head containing a very bright spot, or nucleus, which in some comets is surrounded by concentric envelopes, while in others bright jets appear to issue from it; the tails, which in almost all comets extend an enormous distance from the head, are subject to rapid changes, usually elongating with great rapidity as the comet nears our sun.

The spectroscopic result obtained by Huggins shows that instead of giving a spectrum of bright lines or of dark lines the head of a comet yields one of the channelled-space type, in which bright bands are separated by dark spaces. Further, these bright bands coincide almost exactly in position with the spectrum of carbon or hydrocarbon, so that in the head of a comet the luminous substance most probably consists of a gaseous hydrocarbon in a state of low incandescence.

The tails of comets, on the other hand, give feeble spectra in which many of the lines of the solar spectrum can be distinguished; hence it is concluded that they shine mainly, if not entirely, by reflected sunlight.

So much exact knowledge having already been brought to light by the use of the spectroscope, one might perhaps be inclined to feel satisfied that its work had come to an end; but it would be safer to endorse even to-day the prediction enunciated more than fifty years since by the bold mind of Sir David Brewster, who foretold a great future for the spectrum in these words: "I am persuaded it will open a field of research which will exhaust the labors of philosophers for centuries to come."

GERALD F. YEO.

CITY SKETCHES.

The Broadway Street Ferry—Elevator and Elevated Men.

For many days Broadway has been a river of mud, with ferries at every street corner where there loiter in graceful ease broad-chested policemen, who act as pilots. It is not every one who is piloted over in safety, for all unfortunately are not young and pretty, and these pilots are just human beings beneath their uniforms, and they cannot be expected to disregard a clinging maiden in favor of a spectacled one. Youth and beauty rules the Broadway ferry, for they subjugate not only the pilots, but the roughly dressed, coarse-voiced drivers, who always yell "git-ap" when some poor creature is under their horse's head. Here is a pilot at Fulton street, the most likely spot in town for a tangling up of teams. The pilot is tall and wide as to build, and peremptory as to tone and manner. He catches a struggling horse by the head, pulls him out of the tangle, and sends him splashing away; he howls "Hurry up, now!" to the crowd that has been patiently waiting to cross; he threatens with his club and voice a daring driver who tries to span the ferry without a pilot, and then he changes in an instant from the growling man of war into the courteous gentleman whose sole desire it is to please. The hand which curbed the ire of a powerful horse an instant before is now holding, with a grasp so tender that it wouldn't hurt the petals of a rose, the finely moulded arm of a dear young woman. The ferry is crossed deliberately and safely, and the pilot stands gazing thoughtfully into space, until he is aroused by a frightened scream. A short, squat serving woman, who had dared the river alone, had slipped and fallen. The pilot sees the humorous side to the incident, and laughs. His mirth encourages a driver, who straightway tries to drive over the woman. But the pilot is up in arms at once and beats the horse back, and drags the woman to the ferry landing just as she seemed on the verge of sinking for the third time. "Now, then," yells the pilot, "come on, the whole of yez!" A score of passengers rush through the river and land. A strange thing about this ferry is that it is seldom dried up at this time of year, in spite of the fact that all the passengers who dare it carry away with them liberal quantities of mud.

One of these days some scientific man will win great fame by explaining what effect continual locomotion of an artificial order has upon the human mind. Everybody is familiar with the peculiarities of the men employed on the elevated railroads, and nearly every business man is acquainted with the manners of the elevator "boy." There is a striking similarity between them. There is a resemblance in their uniforms, in their habit of speaking a weird, strange language, in their habit of showing a pugnacious resistance to the stupid public, and in their power of taking up more room than any other class of men on the face of the earth. There is an elevator man in one of the towering down-town office buildings who is a shining sample of his tribe. It is not likely that he would make his mark in any ordinary walk of life, but as the captain of an elevator he is a glowing success. He is about 30 years old, and has a gaunt frame and a dyspeptic cast of features.

"Come now, get a move on; wots de use of plantin' yerself dere? Yer can't grow on marble."

In this way he hurries his passengers in and out of the elevator.

"Is Mr. Smith in this building?" you ask.

"Feefiurumsteen," he answers promptly.

"What!"

This remark stirs all the gall in his system, and he fixes you with his eye and says with heaps of sarcasm:

"Fifth—floor—room—sixteen. Did yer hear?"

This elevator man has adopted, with a good deal of success, the pleasant habit of the elevated brakeman of luring passengers into a mad rush by keeping the door of the car open until the passenger is about to step in it and then banging the door in a highly humorous way.

There were just two vacant seats in the car, and the two fat men who lumbered on board at the next station fell into them in the wheezy, breathless fashion which always indicates haste when applied to fat men. They were apparently on first-rate terms with each other, and after they had recovered their breath they resumed an argument concerning the necessity of wearing ear muffs in cold weather. Both men were considerably past the prime of life, and both were evidently self-made men. The indications of personal success were seen in their habit of making sweeping statements in a loud voice and with a dogmatic manner. In a few minutes it was apparent that it would require a very big house indeed to serve as a dwelling place for both of them.

"I tell you, sir," said one of them, "that ear muffs should be worn, not for the purpose of keeping the ears warm, but to keep the dust out. Don't talk to me, sir; I've made a study of this sort of thing."

"Well," retorted the other man, "it may be necessary to use some protection when a man's ears are abnormally large, but ——"

"Don't tell me I've got pig's ears, sir," interrupted the other big fellow; "people that live in glass houses shouldn't chuck stones."

The train drew up at a station and two ladies entered the car. One was old and roughly clad; the other wore rich clothes, and was young and pretty. The fat man who was opposed to ear muffs scrambled to his feet, and, touching the old lady on the arm, tenderly helped her into his seat. The other fat man clung to his seat stolidly and blinked absently into space until a few stations further on a poor old colored woman came in, and then he, too, forsook his seat, and, lumbering up to his friend, reopened the argument with the old-time vigor.

The man who sat in the last seat of the rear car was a broad-shouldered individual with a Capt. Kidd beard and a bold, assertive mode of action. The first thing he did after he had plunged into his seat was to raise the window and squirt a stream of tobacco juice into the street. He was a man few would care to cross, but the brakeman, with the assurance born of years of tyranny over mere passengers, knew no fear. He walked up to the tobacco chewer, and, sticking a finger at him, said:

"Soy, wadjer tink dis is a bathin' pavilion? Now, don't you spit out de winder no more, d'ye hear! People what walks has got some rights."

The passenger dropped his eyes before this severe and dignified rebuke, and shrunk up in shame. The brakeman stalked out upon the platform, and, leaning over the iron gate, took aim with his pursed lips at a group on the sidewalk, and sent a torrent of tobacco juice within a foot of them.

One of the features of this town is a sad-eyed man who wanders along the big thoroughfares with two dogs on a string. It is supposed that he is desirous of selling the brutes, but he never raises his voice, and when he stands for a minute or two on the curb the dogs get as near him as possible, and, crouching down, blink demurely at the public.

They are both small dogs, but one is a little bigger than the other, and he is more noticeable, because several inches of his tail have been cut off. He is a solemn-looking canine, with a coat the color of brown sugar. The other dog has a woolly coat and a little stub of a tail that is always twitching in a nervous manner. There is nothing about the brutes to indicate any special breed, and no one would suppose that they are anything more than just dogs. They're not.

EVOLUTION OF THE SHOE.

THE PROGRESS OF FOOT COVERINGS FROM ANTIQUITY DOWN.

Soles and Strings were the First Shoes—Odd and Extravagant Styles that have Succeeded Them—The Irish Brogue.

It would be as difficult to fix the period when foot clothing was first worn by man as to fix the date of his existence. All that is known in regard to the former is that in some of the most ancient records allusions to foot coverings occur. These tell that sandals and shoes were made by the Egyptians and the inhabitants of other Eastern countries from the leaves of the papyrus and rawhides over 3,000 years ago; but whether foot clothing was first made from vegetable or animal substances must remain a matter of conjecture. The earliest efforts of foot clothiers were, in all probability, confined to protecting the soles, and consisted of sole guards and fastening appliances. For these linen, rushes, broom, flax, wood, bark of trees, hides of animals, and even metals were employed.

Baudoin, a shoemaker, has written a learned treatise, "De Solea Veterum," in which the origin, material, and form of the earliest footgear are inquired into; and, as an argument in favor of the custom of protecting the feet, he declares that if God had intended man to go barefooted he would not have given him the skins of animals. Pliny makes the assertion that Tychius of Bœotia first wore shoes, but he has not only failed to supply the grounds upon which he based his conclusion, but also the date of the so-called first wearer's existence. From the Greek and Roman classics it is learned that boot, shoe, and sandal making was practised as an art at a very early period, and, that differently fashioned footgear was prescribed by legal enactments to be worn for the easy distinguishment of both rank and profession.


SANDAL WORN IN EARLY ROMAN TIMES.

Plautus, in his "Bacchides," introduces a rich man who wore shoes with soles of gold, and Seneca records that Julius Cæsar wore shoes formed of the same precious metal. In Domitian's reign the streets of Rome were so crowded with shoemakers and their stalls as to necessitate the passing of an edict for their removal. In Rome the shoes worn by the patrician order were made to reach higher up the leg than those worn by the plebeians, while the boots of the common people were fashioned of wood, and slaves are known to have gone barefooted. It is impossible to name the variety of boots, shoes, and sandals worn by the different classes of Greeks and Romans; not only were classes distinguished by their footgear, but even the divisions of classes. Every grade of military and civil life was known by the mode in which the foot was clothed. Writing of Ascension Week in Venice, Evelyn tells how, at its great fair, he saw noblemen stalking with their ladies on choppines. "'Tis ridiculous," he writes, "to see how these ladies crawle in and out of their gondolas by reason of their choppines, and what dwarfs they appear when they are taken down from their wooden scaffolds." On a strange gentleman being asked how he liked the ladies in Venice, he replied that they were "mezzo carno, mezzo ligno (half flesh, half wood), and he would have none of them."

It is possible that the Romans first set the example of using boots and shoes as instruments of torture and degradation. The Romans used a shoe of iron, as the early Christians knew to their cost. The instrument known as "the boot" is described as being made of a slip of parchment. This was placed on the leg wet, and by its steady yet violent contraction caused intolerable pain to its wearer. A boot into which wedges were driven was employed for a like end.


THE CHOPPINE WORN BY THE LADIES OF VENICE.

The brothers Crispin and Crispinian, two shoemakers of Rome, on adopting the Christian faith were expelled from the city. They wandered into France, preaching and working by turns in the several towns through which they passed till they arrived at Soissons, where they suffered martyrdom on Oct. 25, 308. These brothers, in accordance with an old-world Catholic custom, became the patron saints of shoemakers, and on each succeeding anniversary of their martyrdom it is still a practice in many countries for shoemakers to pay tribute to their memories. With regard to the mode in which this was done in England an old rhymster wrote:

On the 25th of October
Seldom a souter's sober.

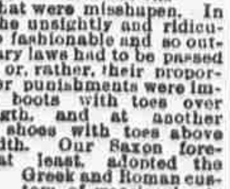
"The shoes worn by the Belgic Britons," says Meyrick, "were made of raw cowhide." Such shoes are known to have been worn by the Irish down to the time of Edward III., and by the Scotch, with certain variations, to a much later date. "The brogue," writes Mrs. S. C. Hall in her "Ireland," "was made of untanned hide; but for the last century at least it has been made of tanned leather. The leather of the upper is much stronger than that used in the strongest shoes, being made of cowhide dressed for the purpose, and it never has an inside lining like the ordinary shoe. The sole leather is generally of an inferior description. The process of making the brogue is different from that of shoemaking, and the tools used in the work bear little analogy." The regular brogue was of two sorts, the single and the double pump, the former consisting of the sole and upper only; the latter had a welt sewed between the sole and upper leather. In the process of making the regular brogue there was neither hemp, wax, nor bristles used by the workman, the sewing all being performed by a thong made of horsehide.

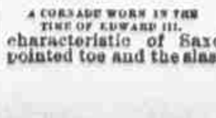

THE DOUBLE PUMP WITH LONG LEG AND ORNAMENTS.

The brogue is worn larger than the foot, the space being filled in with a sap of hay. The Irish brogue makers pride themselves on the antiquity of their trade, and boast over shoemakers, whom they consider a spurious graft on their noble art.

Still more interesting is the account given by Hugh Miller of the shoes even yet worn at Eigg, one of the Hebrides islands. He describes them as being of a deep madder color, soles, welts, and [illegible] and resembling in form the yawl of the Betsy. He says they were sewn by thongs, and altogether the production of Eigg, from the skin out of which they were cut, the lime that had prepared it for the tan, and the root by which the tanning had been accomplished, down to the last on which they had been moulded. He moreover describes how one of the islanders made him a pair of these shoes, the way in which the roots for the liquor (*Tormentilla erecta*) were collected, and the homely tanning of the skin. Shoes have been dug up in England that do not materially differ from these. They are formed from a single piece of untanned leather, slit in several places to allow of a thong being passed through, that, when drawn tight, fastened the shoe to the foot like a purse. The discovery of these early formed shoes proves that it is a mistake to credit Mr. Nicholson, who lived in the early portion of the present century, with the introduction of "rights and lefts."

Charles VII. of France wore coats with long tails to hide his legs, that were the reverse of shapely. Henry Plantagenet, Duke of Anjou, to hide a large and unsightly excrescence on one of his feet, wore shoes with excessively long points. Henry VIII. is said, though there is pretty good proof that extremely broad boots were worn before his time, to have occasioned the introduction of shoes of disproportionate breadth in order to obtain ease and comfort for feet that were misshapen. In all these instances the unsightly and ridiculous forms became so fashionable and so outrageous that sumptuary laws had to be passed to restrict their use, or, rather, their proportions. Fines and other punishments were imposed for wearing boots with toes over two inches in length, and at another period for wearing shoes with toes above six inches in breadth. Our Saxon forerunners, partially, at least, adopted the Greek and Roman custom of wearing boots and shoes to distinguish their rank or station; and from a similar custom that prevailed in France is said to have been derived the proverb "*Etre sur grand pied dans le monde.*" The chief characteristic of Saxon footgear is a long pointed toe and the slashing of the upper. The shoes worn in the eleventh, twelfth, and thirteenth centuries, and, indeed, both before and after, were cut from leather, silk, velvet, satin, and every description of then-existing woven fabric, and ornamentation and extravagance were at different periods carried to absurd lengths. The great Cardinal Wolsey is said to have worn shoes of gold. The probability is that gold embroidery or leather stamped in gold is what he really wore. It is related that a courtier named Robert, in the third Edward's time, wore the toes of his boots so long that he had to stuff them with tow and curl them up like a ram's horn, from which they obtained the name cornadu. The same thing, it is said, was practised as early as Rufus, and they were, before Edward's time, worn in Cracow.


BROAD-TOED SHOES WORN BY HENRY VIII.


A CORNADU WORN IN THE TIME OF EDWARD III.

Legal enactments put them down for a time, but they sprang into existence once more, and a writer of the period says: "A fashion we have lately taken up is to wear our forked shoes almost as long again as our feet, not a little to the hindrance of the action of the foot, and not only so, but they prove an impediment to reverential devotion, for our boots and shoes are so mounted that we can hardly kneel in God's house."

Shoemaking was practised in monastic institutions, excepting those belonging to monks denominated "barefooted," from a very early date, and the existence of the practice appears to have given offence to Richard, the first Abbot of St. Alban's Abbey, who complained of the monks and canons associating with shoemakers and tanners.

Trade organizations are known to have existed among shoemakers from a very early period. The Cordwainers' Company of the city of London was first incorporated by letters patent granted by Henry IV., its title being at that time "The Cordwainers' and Cobblers' Company." The incorporation of this body was again recognized in the fifteenth century by act of Parliament, the provisions of which gave its members power to restrain the making of boots and shoes "after a preposterous fashion," under a penalty of twenty shillings, and to put a stop to Sunday and holy day trading by similar mulcts and fines, or, in lieu thereof, imprisonment.

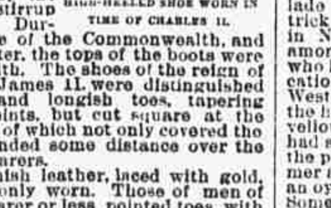
In Edward VI.'s reign, and long after, courtiers wore high boots with very long tops that could be pulled over the knee and half up the thigh when wanted. The boots fitted the leg like a stocking, and closely resembled the buskin. The chivalrous Earl of Surrey is pictured by Holbein as wearing boots of this order. They are slashed across, as was the fashion with the Anglo-Saxons. These slashings are said to have been employed at the time of their revival to "advertise" the rich silk stocking then coming into fashion. Shoes with two straps and latchets, cut similar to those worn some fifty years back, came into vogue at the time of Elizabeth, as did pumps, and a writer of the period possibly alludes to the latter under the name of "pisnettes." "Men," says the same writer (Stubbs), "have corked shoes, pisnettes, and fine pantoffles, which bare them up two inches or more from the ground." Some of these, he says, were made of white leather, some of black, and some of red; some of black velvet, some of white, and some of green. They are moreover said to have been carved, cut, and stitched all over with silk, and laid on with gold and silver. Women at this period indulged in similar extravagances.


HIGH-TOP BOOT WORN IN TIME OF EDWARD VI.

The choppine was introduced into England in the sixteenth century, but it never reached the proportions that it did in Venice and Rome. Shakespeare, in a salutation to a lady, writes, "What, my young mistress, by'r lady, your ladyship is nearer heaven than when I saw you last by the altitude of a choppine."

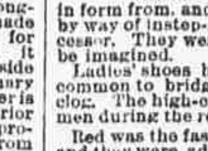
Many of the shoes of this period closely resemble the shoes now worn, and the modern fashion of ornamenting shoes with bows over the instep is evidently a copy of the fashion then in vogue. Shoes of buff leather with slashes in their uppers were very much worn in the reign of the first James, when high boots again came into fashion. These were clumsily formed and were allowed to slouch down over the calves and ankles of their wearers, like untied stocking. It was probably from these boots that wrinkled legs took their rise. About this time a lady is said to have admired "the good wrinkles of a gallant's boots." These high slouching boots were worn by pedestrians as well as by riders.

Apart from the gold lace and silver thread with which "shooties" were edged at this period, the shoes worn did not entail a great expense to the wearers. Dramatists of the same reign, and of that of Charles I., made frequent mention of corked shoes. In a play called "Willy Beguiled," a girl has to say, "I came trip, trip, trip, over the Market Hill, holding up my petticoats to the calves of my legs, to show my fine colored stockings, and how trimly I could foot it in a new pair of corked shoes I had bought." The boots of the Cromwellian era were mostly of buff Spanish leather. They were plain to ugliness, and were armed with a square piece of leather in front to keep the pressure of the stirrup from the instep. During the existence of the Commonwealth, and for some time after, the tops of the boots were of enormous width. The shoes of the reign of Charles II. and James II. were distinguished by high heels and longish toes, tapering toward their points, but cut square at the ends, the uppers of which not only covered the insteps but extended some distance over the shins of their wearers.


HIGH-HEELED SHOE WORN IN TIME OF CHARLES II.

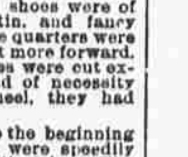
Shoes of Spanish leather, laced with gold, were also commonly worn. Those of men of fashion had squarer or less pointed toes, with huge flaps ornamented with diminutive buckles, the heels being somewhat higher and covered with colored leather.

Buckles, it is said, were first used in the reign of William III.; but the brass of Robert Attelath, at Lynn, who died in 1376, is pictured with shoes with buckles. The costliness of many of the buckles so worn is placed beyond doubt from the fact that they were often fashioned of the most precious metals, and studded with brilliants. William himself wore high jack boots, scarcely differing in form from, and having the same belongings by way of instep-guards, as those of his predecessor. They were cut as ugly as can possibly be imagined.

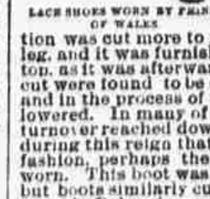

BUCKLE SHOE WORN BY WILLIAM III.

Ladies' shoes had high heels. It was quite common to bridge the arch with a leathern clog. The high-cut quarter shoe was worn by men during the reign of George I. and II.

Red was the fashionable color for their heels, and they were adorned with buckles of large dimensions. The shoes worn by ladies at this time were much handsomer than those worn by their immediate predecessors, the ugly square toes having given way to toes less broad and more sightly. The clog worn was also an improvement, the heel of it being sunk to receive the heel of the shoe. The uppers, cut from silks and satins, were richly embroidered. The heels of these shoes were of wood, covered with silk, satin, and fancy leather. As time advanced shoe quarters were cut lower, and the heel brought more forward. In 1790 the shoes worn by ladies were cut exceedingly short in the vamp and of necessity low in the quarters. As for heel, they had scarcely any.


LADY'S SHOE OF THE TIME OF GEORGE II.

Buckled shoes lasted down to the beginning of the present century. They were speedily succeeded by shoes fastened with strings. The bucklemakers, who were almost ruined by the change, petitioned the then Prince of Wales to leave off wearing shoe-strings in favor of buckles, but his readiness to oblige the petitioners did not materially serve them. In the reign of George III. close-fitting top boots, the legs of which were cut from grained leather, were very commonly worn. The upper portion was cut more to resemble the form of the leg, and it was furnished with a turnover, or a top, as it was afterward called. High boots so cut were found to be difficult to get on and off, and in the process of time the height of leg was lowered. In many of these lowered boots the turnover reached down to the ankle. It was during this reign that the Hessian came into fashion, perhaps the handsomest boot ever worn. This boot was a German importation; but boots similarly cut are known to have been worn in Bohemia as early as 1700. This was followed by the Wellington.


LACE SHOES WORN BY PRINCE OF WALES.

In the reign of George IV. ladies wore boots laced up the front. Side lacing revived in that of the succeeding monarch, and the "Adelaide" boot took its name from William's consort. Sandalled slippers were also concurrently worn, and remained in fashion till the early portion of the reign of Victoria. Ribbon for shoe strings was commonly employed at this period. The cut of the quarters of shoes has since undergone many changes, and military-heeled boots have become quite common for ladies' wear. There was an interval when the high heel was superseded by the low, but recently the high heel has once more asserted itself.


SHOE WORN IN THE TIME OF OUR FOREFATHERS.

The Blucher, which came into fashion in the early portion of the present century, continued in great favor down to a very recent date, and even yet it is not entirely displaced. The introduction of elastic within the memory of readers of moderate age did much to discountenance the Blucher boot.

THE TRIGGERLESS GUN.

GUN FIGHTERS' ROUGH-AND-READY IMPROVEMENTS IN REVOLVERS.

How Cowboy Sinclair Fanned the Hammer at Mr. Riley—What Can and What Cannot be Done with Revolvers.

From the San Francisco Examiner.

When Deputy Marshal Nagle shot ex-Judge Terry he used a revolver without a trigger, a sort of weapon much affected by men on the frontier who are liable to get into gun fights with other gentlemen quick on the draw. To the aver age handler of firearms a gun without a trigger seems a most useless contrivance—much like a watch without a dial or a wagon without wheels. He cannot understand how a firearm could be discharged to any purpose if it lacked that

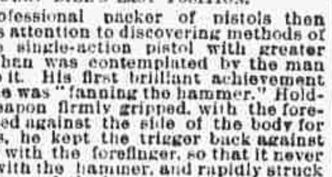

DECEIVING THE ENEMY.

essential part of its mechanism. But the gun fighter is necessarily an ingenious person, independent of and untrammelled by the canons and conventionalities set up by the peaceable and amiable Eastern gentlemen (tenderfeet) who design and manufacture deadly weapons for use in the wild and woolly West. The gun fighter who does permit the gunmaker to prescribe the manner of using a gun is not extant—he is dead. The live gun fighter is he who spoiled his weapon as soon as he bought it by removing the trigger and reducing the working parts of the lock to hammer, mainspring, and cylinder pawl.

In a combat between men accustomed to the use of pistols the issue depends mainly upon quickness in drawing and firing. A fraction of a second may be enough to determine which man shall be changed from tall to long. The makers of pistols thought they had produced a perfect weapon—one that met all the demands of gentlemen in the killing line—when they devised the double-action revolver, and for a short time the self-cocker had a great sale on the frontier. A few years ago no Texas cowboy or ranger, no Colorado Sheriff, Arizona rustler, or Panhandle tough, considered himself correctly dressed unless he had a double-action frontier six-shooter or two at his belt.


CURLY BILL'S FIRST POSITION.

But time developed the imperfections and shortcomings of the self-cocker. Theoretically it seemed perfect, but in actual use it developed a dangerous tendency to get out of kilter. Its mechanism was too complicated and delicate. After a little wear of the lock, when a gentleman desired to assassinate an acquaintance, he was likely to be disappointed by the failure of the trigger to carry the hammer back to the proper notch, or perhaps the cylinder would forget to revolve, and the acquaintance would have time to insert a knife into his stomach or cave in his head with a club, which was very unsatisfactory. Thus, the self-cocker incurred the deep displeasure of the fighting men. They jeered at its eccentricities, abused it for its little weaknesses and discarded it from their toilet. The windows of pawnshops and second-hand gun stores were filled with large, dangerous-looking double-action revolvers, which thereby were made familiar to the Eastern tourist and the globe trotter. The faster the cowboy and the Sheriff threw away these guns the more firmly fixed became the belief in the lay mind, so to speak, that the self-cocker was the favorite weapon of the frontier, because that style of gun was most frequently seen in the dealers' windows. While the Western gun fighter was ordering plain, single-action revolvers, the makers were diligently unloading their stock of complicated self-cockers on the tenderfoot.


CURLY BILL'S LAST POSITION.

The professional packer of pistols then turned his attention to discovering methods of firing the single-action pistol with greater rapidity than was contemplated by the man who made it. His first brilliant achievement in that line was "fanning the hammer." Holding the weapon firmly gripped, with the forearm pressed against the side of the body for readiness, he kept the trigger back against the guard with the forefinger, so that it never engaged with the hammer, and rapidly struck the thumb ear of the hammer with the edge of the left palm. The result was a fusillade like a bunch of firecrackers. The trick was first introduced to the public in New Mexico, and became very popular among the rough shooters and the cowboys who hang about railway stations for the edification of tourists. Tenderfoot writers of wild Western yarns revelled in tales of "fanning the hammer," and railway travellers told marvellous stories about the wonderful skill they had seen displayed by the hilarious cowboy of the plains. They had seen a man fan the hammer and put six shots through the bottom of an oyster can at fifty yards in no time at all. Sometimes a silver dime was substituted for the oyster can in the story.

In 1881 a cowboy named Bob Sinclair worked the new trick in Albuquerque. For some reason or other he had concluded that Jack Riley was an improper person, and that the continued existence of Mr. Riley was an impertinence not to be tolerated. Wherefore he fanned the hammer at Riley. There is no doubt that Mr. Sinclair made a great deal of noise in a very short time. His performance on the six-shooter was rhythmic and inspiring, and the sweep of his left hand was a poem. A carpenter shingling the roof of the new hotel received one bullet in his right heel; some glassware behind the bar of the corner saloon was broken; an Indian card party behind a lumber pile two blocks up the street was dispersed with the loss of one buck; a fourth ball inserted itself in Mr. Sinclair's left foot, and the other two escaped in the confusion, and are still at large. After the smoke of battle had cleared away Mr. Riley picked up a board and swatted Mr. Sinclair on the ear.

It is doubtful if anybody yet has succeeded in firing six consecutive balls into the same township by fanning the hammer. However, it is a useful accomplishment for a barkeeper in a tough town. When a man begins to fan the hammer in a saloon everybody else goes out, there is such a delightful uncertainty as to where the bullets will fly.

When the novelty had worn off this trick, the men who carried guns for business purposes and had a serious aim in life, viz., the shortening of it for other people—the men who were not enamored of mere noise and pistol pyrotechnics—took the triggers out of their guns or lashed them firmly back against the guards, thereby throwing them out of commission.


AN UNDERHAND SHOT.

The adoption of the triggerless gun made necessary the acquirement of skill in new methods of handling the weapon. The first and most obvious scheme was to work the hammer with the thumb in the ordinary way, letting the hammer slip and fall when the aim was secured. Anybody who tries this for the first time will discover that it is not easy to shoot where he looks, or to hold the weapon steady. In quick firing, the pistol is raised and carried back over the shoulder, and then thrown sharply forward and downward. The thumb, grasping the hammer, cocks it during the movement, and when the barrel is at the desired position the hammer is released and the weapon discharged.

A revolver can be fired very rapidly in this manner, but no great accuracy of aim can be obtained. A novice would find it difficult to hit a door at twenty feet, and an expert is doing pretty well to hit within the outlines of a man at ten paces. The cowboy who can hit an oyster can at ten feet, throwing the pistol down in the manner described, is a rare bird.

With the triggerless gun experts can duplicate Curly Bill's famous trick with the self-cocker. That celebrated scoundrel, being ordered by Sheriff White, in Tombstone, to give up his weapons, took a self-cocker from his belt and handed it toward the Sheriff, butt foremost. Just as the Sheriff, thrown off his guard, reached for the weapon, Bill whirled it over in his hand, pulled the trigger, and murdered the officer. Every cowboy and frontier tough has been practising the trick ever since.

The same trick can be done with a triggerless revolver. The weapon is laid in the palm of the hand, butt to the front and right, as shown in the cut. The forefinger, slipped through the guard, serves as a pivot upon which the pistol turns when given a quick twirl, the other fingers assisting in giving the weapon impetus and grasping the butt when it comes into position. Just before the revolver comes down to a level the thumb catches and retains the hammer long enough to draw it back. The thumb is then allowed to slip from the hammer, and bang goes the gun. It will be found that a very sharp and sudden movement is required to perform this feat, and the heavier the pistol the more readily it can be done. It is useless to try it with the pocket toys usually carried.

The joyous jugglers with pistols, who keep the ammunition factories going, have devised some variations of Curly Bill's great play, all of them interesting as tricks, but about as useful in border warfare as jig steps in a walking match. For example, the pistol is held as though to be surrendered, lying in the palm of the right hand, the second finger hooked over the hammer. A sharp twirl throws the barrel down and outward, the forearm is brought up,


JUGGLING WITH A GUN.

and the weapon comes into the position shown in the sixth cut. The second finger simultaneously pulls the hammer back, and the action of closing the fingers around the butt releases the hammer. In the performance of this trick the strength of the middle finger is the principal factor. To do it well a man must have very strong hands, and he will get many a blister before he succeeds in the trick. If he begins with a loaded weapon, his first achievement will be filling his own stomach with lead.


TWIRLING THE GUN.

A better variation is achieved by using the thumb to cock the weapon. The revolver rests in the palm in a very innocent-looking position, butt to the left and hammer under the thumb. By sharply closing the hand and giving the weapon a whirl downward, the hammer is thrown back to full cock and the barrel brought to a level wrong side up. As the thumb slips over the hammer to grasp the butt the revolver is discharged, and the other man gets hit if he happens to be in the way.

It is possible to imagine circumstances under which adroitness in juggling with pistols might be useful, but it is one chance in a million that a man ever will get caught in such a fix, or have an opportunity to work such schemes. A traveller might get away with a stupid road agent by an underhand shot, but ordinarily the man who wants another's revolver is smart enough to keep the drop and take the weapon from holster or pocket with his own disengaged hand.


FANNING THE HAMMER.

The common cowboy of commerce, who is notoriously a marvellous pistol shot, but actually a very mediocre marksman, and oftener a regular duffer with a gun, delights in tricks and juggling. He can twirl his pistol in the air and bang away at the wide, wide world with great satisfaction to himself and danger to the spectators, but he can't do one-tenth of the things that he brags about doing. In plain, straightaway, efficient shooting he is no match for any one of half a dozen citizens of San Francisco, a dozen or fifteen New York experts, as many well-known Boston marksmen, or the members of the St. Louis Pistol Club. Ira Paine never pretended to do what the cowboys and gun fighters of the frontier are credited with doing by people who like to tell tall yarns, and yet he was one of the most famous pistol shots in the world. No man living ever hit a half dollar with six consecutive revolver shots at fifty yards. It takes an expert to hit the half dollar all


DIFFICULT AND USELESS.

the time at 10 paces, and he has to take careful aim to do that. Anybody who tells about seeing frontiersmen shoot dimes in the air, perforate distant oyster cans with countless bullets while riding at full speed, drive nails off-hand without taking careful sight, and all the other popularly accepted marvels, talks blue bosh. The man who could do such things with a revolver could make more money in a month by giving public exhibitions than he can get punching cows for five years.

The revolver is of use on the frontier in killing men who are unpopular or otherwise objectionable, and the man who can draw quickly and hit a man across the street is a good enough shot for all practical purposes. Mr. Nagle, who is considered a pretty handy man with a pocket gun, held his weapon in both hands when he shot Mr. Terry, who stood within two or three feet of him, and even then he missed with one bullet.

TORTURING LIVE POULTRY.

Is It True That Fowls Are Shipped in Crates that Destroy Health and Life?

The pains and brutal treatment of live cattle en route from the West to New York have often been the subject of comment and even of legislation, but the friend of live poultry has yet to be heard from. The country dealer in live poultry packs (there is no word that better describes the thing done) his geese, ducks, chickens, &c., in crates of the smallest possible height that he can get the fowls into, and each crate is packed until the fowls are as close to each other as dead sardines are in their boxes. Then the crates are stowed in two rows from ten to twelve feet high on a flat car or in an open cattle car, and away they go. When the car reaches the New York terminus it is drilled about on the switches, and finally, after no one knows how many hours of misery on the cars, the fowls are placed on trucks and driven to the consignees at the markets. There the dead are taken from the crates and the living during that day or the next go to the retailers. It is not until after three or four days in that vile prison that the fowl is relieved from its torture by death.

That they suffer real torture is evident on a moment's consideration. It is a pity that the shippers could not be made to realize what the torture is by packing them shoulder to shoulder, in crates so low that their heads must be kept forward, and their chins on their breasts continually; or, to approximate the condition of the fowls accurately, they should be obliged to stand with their backs bent at an angle of 30°. People who have tried to sleep with their legs curled up in a railroad seat, and have woke up with the cramp, wishing they could straighten out for just one minute, may form a slight idea of what the fowls suffer during a three days' confinement in a coop.

The fact that a definite per cent., tolerably well known among poultry dealers, of the fowls die from their suffering is also conclusive evidence that the suffering is great.

Further than that, they are kept for a long time without water to drink, while the lower crates in the stocks on the cars become intolerably offensive from the drippings from the upper tiers.

There does not seem to be any adequate remedy for this condition of affairs. The shippers have calculated the losses from death and find that the losses are less than what the increased cost of freight would be were fowls shipped in crates high enough to allow them head room. That the fowl gets the headache and becomes feverish is a fact of no consequence to the shipper, because it does not diminish his profit.

In many meat markets in the city one can see signs saying that fowls will be killed to order. The buyer has an idea that he can there get fowls in better condition than when he buys the country-killed fowls. Very likely he can in some well-managed shops, whose proprietors take pains to turn their fowls out in a clean yard to recuperate, but it is almost enough to give a person the typhoid fever to eat a fowl killed out of one of the miserable crates they must travel in when coming to New York. If any one thinks this is overdrawn let him watch a truck load of crates as it arrives at one of the markets some morning.

NO END TO THE FREIGHT.

THE RAILROADS OUT OF NEW YORK ARE BLOCKED.

There Has Been a Rapid Growth in the Offerings of All Sorts of Freight—Not Enough Cars—Definite Figures from Several Yards—Not a Local Boom Only.

If one may judge of the general prosperity of the nation by the amount of freight offered for transportation not only on the great trunk-line railroads, but on the backwoods and cross-lot roads as well, then there never has been a time in the history of the country when people were making as much money as they are now. According to one competent authority to whom a reporter talked on the subject, there is not a road in the country that has enough cars to handle its traffic with desirable rapidity, and there is not a trunk road that is able to entirely keep up with its work with freight. In other words, the side tracks are holding freight which the companies would very much like to forward, and which they will forward just as soon as they can; but when that is to be done no freight agent will say definitely, unless the freight is perishable. Naturally the trunk lines, like the Pennsylvania, the Central, the Erie, and the Baltimore and Ohio, feel the increase in traffic more quickly than smaller lines, but it is a noticeable feature of the business of the last three months that the roads counted as unequal to a combat with the Pennsylvania and the Central have gained a greater percentage in their freight traffic than the two giants have.

Some indication of what the gain in traffic has been can be found in the amount of business done in some of the yards about New York. In no yard has a greater increase been noted, probably, than in the Erie. A reporter went to the office of the Erie yardmaster to ask him about it.

"Certainly, I'll tell you; but just wait a minute," he said, and then he went in among a mass of moving cars and locomotives that was bewildering to one unaccustomed to the scene. After a while he came back and stood beside the reporter, and talked for about three minutes. Scarce a sentence was spoken without his either giving an order to some of his assistants by waving his hands, or breaking off what he was saying to the reporter to give an oral order to a yard man.

"We are glutted, you may say," he said. "We are just on the verge of paralysis. Look at my chin; I have not had time to get shaved. We are handling all that comes to us, but I am astonished when I see how we get through with it. We are not idle a minute. We work full forces twenty-four hours in the day and every day. Just to give you an idea of what we are doing, there are to-day 4,000 cars in sight. By that we mean that here and at Bergen are 4,000 cars of which we have received the bills. That is what business is to-day. In ordinary times we have, say 500 cars in sight."

"Is your gain in east or west bound traffic?"

"Both. The gain is just as great in one as in the other. The loaded cars that come in are filled up just as quick as they are discharged, and away they go, and yet there is a constant and increasing demand for more cars out on the line. I cannot say that this demand for cars has increased at any one point especially. It is simply a universal increase which in the aggregate makes a very loud demand. We are not at all able to supply it promptly. The shippers have to wait their turns. And yet there never was a time when so much business was done in a day as we can do now—not alone in this yard, but at all points on the road.

"I am unable to account for the increase. It does not come in any one line of goods. We get more of everything to handle—grain, flour, meat, live stock, lumber. It is not due to the season of the year exactly, although business is naturally a little better in November than in midsummer.

"The increase is not confined to the Erie. I am told by men on the other roads that they are crowded as we are. I know that all the roads, big and little, that we connect with are crowded to the limit. There is not a road in the country, so far as I can learn, that has enough rolling stock to handle its traffic in a satisfactory manner."

The Pennsylvania has two freight yards on the Jersey side of the North River, one known as the Jersey City yard and the other at Harsimus Cove, four blocks north of the first. It is at the cove that the through traffic is handled. The Jersey freight, of which garden truck and fruit are so large an item in the summer, is no larger now than it was some months ago, but at the cove the volume of freight has materially increased.

The exact number of cars handled in this yard in the month of November was 20,485 east bound and 19,134 west bound. This was about 5,000 more cars in the aggregate than were handled in the same month last year. This does not tell the whole story, however, for up to the month of November sixteen locomotives working day and night were able to handle the yard traffic, but since Dec. 1 eighteen locomotives have been employed, and have been kept at it every minute of each day. This will show an increase of one-eighth in December's traffic over November's.

"I can remember how only a few years ago," said an employee, "we used to employ but one engine in this yard, and there were but four tracks. Even with only one engine we had several hours for playing checkers every day. That was in 1875."

The Pennsylvania is such an immense system that a complete block at any point would prove serious, for every branch is running full. There are cars a-plenty on the side tracks at all important junctions now. The same may be said of the other trunk lines, however.

At the yards of the New York Central the increase in business over ordinary times is very plain to a practised eye. At the freight yard at the foot of West Thirtieth street, for instance, they are handling on an average 850 cars every day. This is an increase of nearly 300 cars per day over ordinary times. There are so many cars in the yard that every inch of track not needed for drilling is constantly full. Reports from up the track say that at Albany and at Buffalo as well the side tracks have endless lines of cars, while the number of miles of track occupied by the trains in motion is almost incredible.

At every place visited by the reporter there was the same story to tell. The Baltimore and Ohio, the Jersey Central, the Lehigh, the Delaware and Lackawanna are all working under a full pressure. No one seemed able to account for it, but the fact is beyond dispute. Tug and lighter men are feeling the weight of traffic in the extra hours that must be put in to get the freight from one part of the harbor to another. Not only do the boats owned by the road have to work much more than usual, but outside boat and lighter owners are having such good times as they have not been accustomed to.

If railroad employees about the metropolis do not have a merry Christmas it will not be for lack of work before that time.